J. Beddall Smith

THIRTEENTH ANNUAL REPORT

FROM THE

ANALYTICAL LABORATORIES

OF

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EDITED BY

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PREFACE.

IN publishing our thirteenth Annual Laboratory Report, we wish to thank the many friends who have signified their appreciation of our yearly contributions to the study of drugs and their preparations, and to express the hope that the present edition will be found of equal interest to former issues. The general arrangement of the notes continues as heretofore.

During the year several questions of great importance to Pharmacists have occupied their attention. Amongst them we may especially mention the occurrence of Arsenic in Drugs, and the applicability of Messrs. Dunstan and Robinson's proposed official test—the reliability of the colour tests, official or otherwise—as an indication of the purity of Cod Liver Oil, as also the liability of Camphorated Oil to lose camphor by volatilization or to become decomposed under ordinary conditions. These subjects, with others, have received the attention of the Laboratory staff, and are dealt with in the report.

Standardization has not attracted quite so much attention as was the case last year, and it is now evident that the principle of the Standardization of Galenicals meets with general acceptance, and that its more or less complete application in a new edition of the Pharmacopœia is assured.

We need hardly say with what satisfaction we make this statement, inasmuch as during the whole of the thirteen years in which our report has appeared, and long before that time, we have insisted upon the necessity of the Standardization of Drugs and Galenicals, and have from time to time by our laboratory researches been enabled to suggest suitable standards, not a few of which have been officially recognised.

For the sake of easy reference we again include our table of suggested standards.

The total number of samples dealt with during the year was 6,780, a slight falling off from last year's total of 7,030, but with that exception the highest yet recorded.

CONTENTS.

CRUDE DRUGS, FIXED OILS, WAXES, etc.

THE results of the examination of a large number of samples of Crude Drugs, taken in the condition in which they are found in the market, should prove of considerable interest and of value in the way of suggesting cases where care must be taken to avoid stocking drugs impure or of low value.

In this connection it should be remembered that low grades of certain Crude Drugs have their legitimate uses in the manufacture of alkaloids, etc., and that the application of the principle of standardization generally to Crude Drugs, valuable where the drugs are themselves administered in powder form, must lead to inconvenient results.

The addition of inert matter to reduce the strength of a powdered drug is a proceeding to be avoided where possible, for example, the almost unavoidable addition of milk sugar to reduce powdered opium to the present low official standard does not enhance the appearance of the product.

The figures here given are taken entirely from the year's Journal for 1904, and the following points should be borne in mind :—

Specific gravity ... $d\frac{15}{15}\cdot\frac{5}{5}$°C. unless otherwise stated.

Optical rotation ... = degree of rotation with sodium light using 100 mm. tube.

Temperatures in degrees Centigrade.

Acid, ester, saponification values

are equivalent in each case to the number of milligrammes of KHO required for 1 gramme to neutralize the acid, saponify the ester, or in case of saponification to the sum of these two.

Aloes, Socotrine.—Five samples, some in original skins, others in tins, proved to be of uniformly low quality, yielding 33·7 to 46·2 per cent. of cold water extract.

Annatto.—A specimen of this drug in cakes proved to have the following composition :—

Moisture	34·65
Organic matter	57·44
Mineral ,, ...	7·91

40·50 per cent. was soluble in hot spirit, one-third of which was resin.

Asafetida.—Eight samples were examined during the year, none of which in any way approached the standard of the B.P. The actual figures were :—

Soluble in 90 per cent. alcohol ...	17·08 to 39·52 per cent., average 23·8
Ash	26·19 to 62·50 ,, ,, 42·9

Asphaltum.—A single sample gave ash 0·08, soluble in Petroleum Spirit 79·4 per cent., and was apparently free from artificial coal products.

Atropine Sulphate.—The melting points of samples examined ranged from 183° to 186°, and were all held to be reasonably free from Hyoscyamine Sulphate.

Beeswax.—A large number of parcels of both English and foreign yellow beeswax have been examined, the figures obtained ranged between the following limits :—

Melting point	62° to 63·5°C.
Specific gravity	0·967 to 0·970.
Acid number	15·7 to 20·9.
Saponification	94·1 to 100·1.

Qualitative tests for paraffin, etc., all gave negative results.

The results of the examination of a number of samples of white beeswax show considerably more variation than the above,

in point of specific gravity especially, a large number of samples indicating above 0·970, where other figures were normal.

Belladonna Root.—Four samples gave, respectively, 0·34, 0·45, 0·51, 0·47 per cent. by titration of total alkaloids, the average being 0·45 per cent., a figure not differing appreciably from those of former years.

Benzoin (Sumatra).—Sixteen samples of this drug examined during the year proved to be of fairly level quality, the average figures not differing to any great extent from those published in previous years. The assays were performed by the method published by Barclay and Mann (Laboratory Report, No. 11, p. 30, and *Chemist and Druggist*, 1902, March 15):—

Solubility in 90 per cent. alcohol... ...	71·60 per cent.
Free Balsamic Acids calculated as Benzoic	8·13 ,,
Combined ,, ,, ,,	13·75 ,,

Cannabis Indica.—A sample marked "Guaza Siftings" proved to be of high resin-content, yielding alcohol soluble 14·12 per cent., resin 11·08 per cent.

Carmine.—Four samples examined—moisture ranged from 11·46 to 17·00 per cent., ash from 4·05 to 8·26 per cent.

Carnauba Wax.—Nine samples were tested during the year, of which seven were normal and gave the following results:—

Specific gravity	0·998 to 1·006
Melting point	83° to 86·5°C.
Saponification value	73·7 to 85·2.

The remaining two samples melted at 74°, possessed a specific gravity of 0·966, and were obviously fictitious.

Cascara Sagrada.—Five samples of matured bark proved very similar as regards water-soluble extract. The figures ranged from 20·96 to 22·56 per cent.

Castor Oil.—

Specific gravity	0·962 to 0·964.
Saponification value	178·7 to 181·9.
B.P. colour-test	Yellowish-brown in all cases.

We have yet to meet with a sample of this oil which could be held to comply with the B.P. colour-test.

Cerasin (Yellow).—

Specific gravity	0·966 to 0·999.
Melting point	47·7° to 54·0°C.
Saponification value	71·3 to 97·7.

This is obviously a fictitious article, probably compounded with colophony.

Cetaceum.—Several samples were examined, and in each case the B.P. requirements were complied with. Saponification values ranged from 122·8 to 124·4.

Cetaceum, Oil of.—The figures given below show the range met with in the examination of ten samples of this oil, there being but little variation experienced from year to year :—

Specific gravity	0·876 to 0·881
Saponification value	123·76 to 130·38
Iodine value	77·94 to 84·33
Non-saponifiable matter ...	34·37 to 39·47 per cent.
Fatty acids	60·56 to 64·85 „

Citric Acid.—A large number of samples examined proved to contain minute traces of lead only, the amount varying from 0·0006 to 0·0013 per cent. In our experience Citric Acid has for some time past been remarkably free from this form of contamination.

Coca Leaves.—Five samples of Peruvian leaves, all of fair quality, contained :—

Total alkaloid ... 0·62 to 0·73 per cent., averaging 0·70.

Cochineal (silver grain).—A sample was met with giving 18·39 per cent. of ash; three others ranged from 2·54 to 3·90 per cent. Water soluble matter, 35·3 to 42·5 per cent.

Cocoanut Oil.—As we noted last year, very little variation apart from that due to colour is experienced in this oil. The figures obtained from the examination of twelve samples were:—

Specific gravity at 99°C. (Water at 15·5°C. = 1·000)	0·867 to 0·872
Melting point	23° to 25°C.
Saponification value	257·3 to 262·4

Cod Liver Oil.—The question of the reliability or otherwise of the colour-tests for this oil has attracted a considerable amount of attention during the year, and we have found it necessary to make further experiments in order to throw light upon a few points left untouched last year.

The result of these is contained in the note on page 10 (reprinted from *The Chemist and Druggist*, Nov. 26, 1904, p. 883).

In view of the renewed interest taken in this subject, we have also reprinted the table of figures, etc., published last year, which included the results of the application of the colour and other tests to all the specimens of likely adulterants then obtainable.

We are glad to be able to amplify this table with the results of a refractometric examination of the samples which Mr. C. G. Moor, M.A., has been kind enough to place at our disposal.

The examination of a few samples of Norwegian Oil obtained from various reliable sources during the present year has given the following results:—

Specific gravity	0·925 to 0·929
Saponification value ...	184·1 to 189·8
Free acid as oleic	0·46 to 0·79 per cent.
Non-saponifiable matter ...	4·12 to 6·21 „
Iodine absorbed	141·03 to 145·41
B.P. and Meyer colour-tests ...	Normal in all cases.

Notes on the Colour-tests.—

"A drop of sulphuric acid added to a few drops of the oil on a porcelain slab develops a violet coloration."

These are the words describing the British Pharmacopœia colour-test for cod liver oil, a test concerning the value of which there has been much dispute. In the first place it seems possible that discrepancies may arise from differences in the manner of carrying out the test. A literal reading requires the acid to be added to the oil and the whole left undisturbed; under these conditions we have found that with genuine oils the drop of acid assumes a dark reddish-brown colour with violet streaks crossing its surface. If the mixture is now thoroughly stirred, a vivid violet coloration will develop. There seems little room for doubt that this is the result officially intended, and in consequence a direction to stir must be read into the B.P. description. Working in this manner, we have never yet met with a genuine steam-prepared oil which has failed to give the violet coloration, but, as reported in our twelfth Annual Report, page 11, and *The Chemist and Druggist* (December 5, 1903, page 939), have found other liver oils to give violet colours in some cases equally intense with that of pure cod liver oil. Meyer's test similarly does not develop any intense tint until the mixture is stirred, when a vivid salmon-pink is obtained—a result which, as before reported, we have found to be confined to cod liver oil, and which, as far as our experience goes, is invariably given by such oil.

In view of statements concerning the effect of age, hydrolysis, etc., on the colour-reactions given by the oil (*The Chemist and Druggist*, January 16, 1904, page 92), the result of the following experiments may be of interest. Three samples of oil prepared as under were taken as representative of varying conditions of the oil:—

1. Selected livers were taken, carefully freed from gall, and the oil rendered at a temperature not exceeding 80° C. in three portions, each of which was carefully refined and filtered. The amount of free fatty acid, calculated as oleic, ranged from 0·19 to 0·25 per cent.

2. Selected livers were placed in a barrel and allowed to stand in a warm place for three months. At the end of that time the livers were much

decomposed and a brownish oil had risen to the surface. This was removed and treated as before. Free fatty acid was 5·02 per cent.

3. A sample of Norwegian oil, 1903, prepared in our own factory, and containing 0·71 per cent. of free acid.

Subjected to the sulphuric-acid test, samples 1 and 3 gave the orthodox coloration; sample 2 gave a violet coloration, but the purity of the colour was marred by a strong brown shade. With Meyer's test, no difference could be detected between the three.

The conclusions to be drawn from these experiments and our own experience seem to be that while, given a genuine oil prepared from fresh livers, the correct violet colour of the B.P. test will always be obtained, it does not by any means follow that the converse of this is true, for, as we have previously shown, a sample may be largely adulterated or even consist wholly of foreign oil and yet give a perfect sulphuric-acid reaction. Meyer's test (which we prefer to use prepared from two vols. of nitric acid and one vol. of sulphuric freshly mixed) has invariably in our hands given a vivid salmon-pink with genuine oils, but although we have yet to meet with an adulterant which gives a colour in any way approaching that of the pure oil, a reference to our former communication will we think show that mixtures might be prepared which would give more or less satisfactory colours with this test.

It will therefore be seen that to a large extent the colour-tests are of negative value, and that while failure to obtain the reaction or production of a much modified reaction would necessarily imply adulteration, on the other hand, success with the tests does not absolutely guarantee freedom from admixture of allied oils; and in the present state of our knowledge of cod liver oil, the safest course for the retailer would appear to be to stock reliable oil from an authentic source.

TABLE OF FISH LIVER OIL CONSTANTS.

	Sp. Gr.	Iodine absorbed.	Free Acid.	Saponification number	Unsaponifiable.	Reichert Figure (2·5 g.)	H_2SO_4 Test, before stirring.	H_2SO_4 Test, after stirring.	$HNO_3+H_2SO_4$ Test, before stirring.	$HNO_3+H_2SO_4$ Test, after stirring.
Cod Liver Oil (Norwegian) ..	0·9262	147·79	0·36	184·1	7·74	2·0	red-brown, tinged violet	violet	orange-pink	vivid salmon-pink
Cod Liver Oil (Newfoundland) ..	0·9258	139·25	0·45	188·4	9·87	2·0	red brown tinged violet	violet	brownish pink	ditto, but not so vivid
Cod Liver Oil (Japanese) ..	0·9252	134·96	1·40	186·7	7·18	1·4	intense violet	intense violet, nearly black	bright violet	greenish brown
Whale Oil	0·9192	92·38	2·08	188·6	7·70	0·4	light brown	vandyke brown	pale brown	very pale pink
Shark Oil	0·9290	143·50	6·09	188·5	5·46	0·8	brown	red-brown	brown	brown
Haddock Oil ..	0·9318	160·00	2·67	191·2	2·42	1·1	orange-brown	brown	light-brown	orange
Coalfish Oil ..	0·9272	139·10	1·35	186·1	6·52	0·7	brown, tinged violet	violet	orange-brown	pale pink
Seal Oil	0·9275	123·40	2·79	194·5	3·60	2·5	dark brown	intense vandyke brown	pale brown	pale orange
Dugong Oil ..	0·9203	66·60	2·39	197·5	3·74	2·5	orange	brown	pale orange	very pale brown
Ling Oil	0·9231	122·80	0·29	181·6	6·44	0·7	violet-brown	violet	light brown	pale brown
Menhaden Oil ..	0·9301	145·80	2·50	186·1	6·73	2·2	brown	brown	pink	light brownish pink
Hoi Oil	0·9186	116·60	0·18	164·7	15·06	1·8	orange, tinged violet	vivid violet	light-brown	pale orange pink
Brusmer Oil ..	0·9222	130·11	0·13	180·4	4·92	1·9	violet	vivid violet	brown	pinkish orange

REFRACTOMETRIC EXAMINATION OF SAMPLES OF COD LIVER OIL AND ITS ADULTERANTS.

	Zeiss reading at 25°C.		Zeiss reading at 25°C.
"A1" Norwegian ..	77·2	Seal	72·6
Newfoundland	77·2	Dugong	60·5
Japanese	76·0	Ling	74·2
Whale	65·2	Menhaden	80·4
Shark	79·2	Hoi	74·0
Haddock	84·0	Brusmer Oil	75·5
Coalfish	77·0		

Colza Oil.—Four samples examined gave :—

Specific gravity ... ... 0·915 to 0·919
Saponification value ... ... 174·6 to 177·0

Copaiba.—A good number of samples of this drug have been examined during the year by the methods given in our last report (Report No. 13, page 14, also *Pharmaceutical Journal*, 1903, 1, p. 419), with the following range as result :—

Specific gravity ... ... 0·977 to 0·986
Resin (brittle in all cases) ... 47·27 to 61·70 per cent.
Acid value ... ... 70·06 to 90·24
Ester value ... ... 6·39 to 9·02
Resin acid factor ... ... 0·658 to 0·763

Cotton-seed Oil.—The figures obtained from three batches of this oil show the great freedom from acidity which is obtained :—

Specific gravity ... ... 0·922 to 0·923
Free fatty acid as Oleic ... ... 0·10 to 0·30 per cent.
Saponification value ... ... 195·2 to 198·0

Cream of Tartar.—A large number of samples have been examined, and have proved in most cases to be of very good

quality in respect of metallic contamination. Lead present ranged from 0·0005 to 0·0025 per cent. An exceptional sample, however, contained as much as 0·022 per cent.

Cream of Tartar substitutes.—Of five samples of powders obtained under this title, four proved to consist mainly of Acid Phosphate of Calcium, together with Calcium Sulphate. The remaining sample appeared to be a mixture of Acid Phosphates of Ammonium and Potassium.

Ergot.—Water-soluble matter in nine samples varied from 13·10 to 22·44 per cent.

Gentian Root.—Several samples examined for water-soluble matter gave 35·40 to 41·00 per cent.

Ginger.—We found it necessary last year to criticise a statement made, and incorporated into an official *Digest of Researches and Criticisms*, that ginger "should not yield less than 5 per cent. of resin to 90 per cent. alcohol." Further experience with a number of samples of different varieties has convinced us that such a standard is impossible, and its effect would be to exclude some of the higher qualities of ginger. The following are figures obtained from samples examined during the year :—

Soluble in 90 per cent. alcohol—

Jamaica ...	4·60 per cent.	Cochin ...	6·68 per cent.
,, ...	5·76 ,,	,, ...	8·82 ,,
,, ...	3·76 ,,	,, ...	5·72 ,,
Cochin ...	6·40 ,,	,, ...	5·70 ,,
,, ...	9·08 ,,		

Glucosum.—A sample of solid glucose assayed 98·5 per cent. glucose ; cane sugar absent. Liquid glucose gave 41·37 per cent. glucose, 2·01 per cent. of cane sugar. Arsenic was absent in both cases.

Guaiacum Resin.—Soluble in 90 per cent. alcohol—90·04 to 97·00 per cent. in several samples.

Honey.—An examination of eight samples of English honey, of 1904 crop, gave :—

Ash	0·03 to 0·16 per cent.
Sulphate in Ash	In no case exceeding a faint trace.
Specific rotation	−6·25° to −10·00°.

Hydrocyanic Acid.—"Scheeles'" acid from external sources contained from 4·15 to 4·60 per cent. of HCN., necessitating careful standardization before passing into stock.

Insect Powder.—A sample ground in our own mills from closed flowers yielded 7·26 per cent. oleo-resin when examined by Durrant's method, the amount of ash present being 5·73 per cent.

The amount of oleo-resin, stated by Durrant, as characteristic of the finest flowers was 5·5 per cent., but we have for some time found our powder, ground as above, to yield considerably better results than this.

Ipecac Root.—In our last report, when commenting upon the fact that a method had been published by A. G. C. Paterson for the determination of Emetine and Cephaeline in Ipecacuanha, which seemed promising, we stated that we hoped during the year to give the method a trial, with a view to arriving at a reasonable standard for the two alkaloids in Ext. Ipecac. Liq. B.P. Our experience with the process, so far, has been very favourable, the only apparent difficulty met with being in the titration of the alkaloidal residues. These residues are somewhat strongly coloured, and in consequence the final reading is somewhat obscured. We append figures obtained from samples of Rio and Carthagena root which may be of interest, but our work on this subject is not yet complete enough to enable us to suggest a standard for the fluid extract.

	Rio.	Carthagena.
Emetine (by titration) ...	1·69 per cent.	1·52 per cent.
Cephaeline (by titration) ...	0·60 ,,	1·38 ,,

Iron, Reduced.—Metallic Iron present varied between 72·2 and 80·7 per cent. The question of the occurrence of arsenic in this drug is dealt with in another place.

Jaborandi Leaves.—Two samples were examined, neither of which could be identified with the official variety. The yield of total alkaloid by titration (calculated as Pilocarpine) was 0·05 and 0·37 per cent. respectively.

Jalap.—Fifteen samples have been assayed during the past year. Total resin present ranged from 6·04 to 10·66 per cent., averaging 8·47; corresponding figures for resin insoluble in ether were 4·20 to 9·20 per cent., averaging 7·26 per cent.

Kino.—A single sample yielded 97·33 per cent. water-soluble matter.

Lime Juice.—In a large number of samples tested the amount of Citric Acid present varied from 32 to 42 grains per fluid ounce.

Linseed Oil.—Figures obtained from the examination of four samples were :—

Specific gravity	0·931 to 0·932
Saponification value ...	181·35 to 189·90
Iodine absorbed	157·0 to 160·61 per cent.

Lupulin.—No sample examined has attained the very stringent standard of the B.P. for ash. Seven samples varied between 13·06 and 21·01 per cent.

Morphine Hydrochloride.—We have not as yet been able to meet with a sample of this salt complying with the B.P. requirement for dissolving without colour in Sulphuric Acid. All parcels examined have given a more or less pronounced red colour when dissolved in cold acid.

Mustard.—Three samples contained :—

Fixed oil	33·31 to 36·11
Mineral matter	4·06 to 4·24

Myrrh.—Two samples of fair, bright Myrrh, yielded 18·44 and 29·00 per cent. respectively of matter soluble in 90 per cent. alcohol.

Neatsfoot Oil.—The characters of the oil sold in commerce as Neatsfoot Oil do not coincide with those of the text books or with what we have ourselves found. The examination of three commercial samples gave :—

Specific gravity ...	0·915	0·915	0·917
Saponification value	184·6	185·6	184·5
Iodine absorbed ...	95·60	99·75	91·56 per cent.

A sample prepared in the Laboratory absorbed 73·3 per cent. of Iodine.

Nut Oil.—Samples tested showed some improvement over last year's figures for free fatty acid :—

Specific gravity	0·917 to	0·918
Saponification value ...	186·0 to	191·3
Free fatty acid	2·21 to	2·37 per cent.

Olive Oil.—A very large number of samples have been examined with results that show very little variation :—

Iodine absorption 81·10 to 85·98, average 83·91 per cent.
Saponification value 187·8 to 193·8, „ 191·4 „

Free Oleic Acid in high-class edible oils ranged from 0·57 to 1·42 per cent., in ordinary pharmaceutical oils from 2·85 to 6·92 per cent.

Opium.—Four samples examined contained :—

Moisture	20·63 to 24·05
Morphine	10·00 to 11·13

It is evident that any of these particular parcels when dried and powdered would yield a powder containing very considerably more Morphine than required by the present low official standard.

Palm Oil.—Three samples proved to be of somewhat better quality than usual, free fatty acid varying from 15·63 to 18·78 per cent.

Pepsin.—In view of a recent attack on the quality of commercial Pepsins, it is of interest to note that of nineteen samples examined, one only failed to satisfactorily pass the white-of-egg test of the Pharmacopœia.

Podophyllum Root (Indian).—A single sample submitted gave 7·36 per cent. of resin.

Sarsaparilla.—A single sample of native red Jamaica Sarsaparilla yielded 18·92 per cent. water-soluble matter.

Scammony Root (Mexican).—A specimen of this so-called Scammony Root exhibited practically identical physical characters with that described by Holmes (*Pharmaceutical Journal* [4] 18, p. 326), and contained 21·88 per cent. of resin, of which 87·1 per cent. was soluble in ether.

Scammonium.—A single sample yielded 2·42 per cent. of ash, and 84·35 per cent. soluble in ether.

Shellac.—The examination of four samples during the year has not shown any marked variation from the normal except in one instance. The actual figures were :—

Acid value	53·35	45·60	57·90	45·94
Ester ,, ...	175·98	141·40	162·42	148·71
Iodine absorption ...	6·86	17·41	18·00	17·02

Strophanthus Seeds.—A considerable number of samples of these seeds examined gave :—

Alcohol (70 per cent.) soluble ... 15·04 to 18·88 per cent.
Strophanthin ... ... 4·03 to 9·60 ,,

A single sample of seeds guaranteed Kombé contained Strophanthin 8·85 per cent.

Tartaric Acid.—The fact that the Food and Drugs Acts' Authorities have shown activity with regard to the presence of lead in Tartaric Acid, has led to still further improvement in the quality of this article. At one time it was the exception rather than the rule for us to obtain samples to comply with our standard (not exceeding 0·004 per cent.). Now we have little difficulty in securing an article testing at 0·002 per cent.

Actual figures for thirty-two samples were 0·0011 to 0·0070, averaging 0·0022 per cent.

The test given for the detection of free Tartaric Acid by Ganassini (*Year Book of Pharmacy*, 1904, p. 173) in our hands has proved capable of readily detecting 5 per cent. admixture of Tartaric Acid in Citric Acid, and seems worthy of further trial.

Tolu Balsam.—Ten samples examined by the methods mentioned under "Benzoin" gave the following results :—

Soluble in 90 per cent. alcohol...70·16 to 89·48 per cent., average 83·8.
Free Balsamic Acids as Benzoic... 8·83 to 19·94 per cent., average 13·74.
Combined ,, ,, ...14·16 to 24·09 per cent., average 19·10.

NOTES ON THE PROPOSED NEW OFFICIAL TEST FOR ARSENIC.

THE recommendations which Messrs. Dunstan and Robinson have recently made to the Pharmacopœia Committee of the General Medical Council as the result of an enquiry into the whole subject of the occurrence of arsenic in drugs must necessarily excite great interest.

In any criticism of Messrs. Dunstan and Robinson's proposed official tests it must be carefully borne in mind that they have started out with the intention of providing a test which it is not out of the power of the average pharmacist to perform with simple and comparatively inexpensive apparatus; similarly with regard to standards the purpose being to fix such standards as will satisfy any reasonable demand for purity without unduly increasing the cost of the drug.

It is probable that for pharmaceutical purposes three tests only for arsenic can be practically considered, they are the Reinsch, the Marsh-Berzelius, and the recommended test, commonly known as the Gutzeit. The Reinsch test may be conveniently dismissed in a few words, it lacks delicacy and involves the obtaining of not only an arsenium stain, but also of the conversion of arsenium into crystals of arsenious oxide, since the staining of the copper foil or gauze is by no means absolute evidence of the presence of arsenic.

The choice of tests is then limited to the Gutzeit and to the Marsh, the latter strictly being the Berzelius modification and consisting of the production of a mirror of metallic arsenium when the evolved gases are subjected to heat. The former being practically the test now official for glycerin and resulting in the formation of a yellow stain by the action of arsenuretted hydrogen on mercuric chloride paper.

The question of the purity of reagents has some bearing on the relative suitability of the two tests for pharmaceutical purposes,

it is comparatively easy to secure zinc, acid, etc., which will give no reaction with the proposed method, while the Marsh test is so delicate that it is a difficult matter to procure such reagents as will give absolutely no mirror. The merits and demerits of the two tests can be summed up in a few words. The Marsh-Berzelius is far and away the more delicate, while the Gutzeit for our purpose is easily the more convenient, and it remains to be seen whether the delicacy of the latter is sufficient to meet any reasonable requirements when its use is applied to drugs, and whether the standards proposed in conjunction with the test are within obtainable bounds.

To this end a very large number of experiments have been made during the last few months in these laboratories. In the first place a Marsh test was carried out simultaneously with the proposed test on a number of B.P. chemicals, and the results compared. The conclusions arrived at were:—

That many of these chemicals gave no reaction whatever with the Gutzeit, but gave a fairly distinct mirror with the Marsh.

That ·004 milligramme of arsenic gives a distinct mirror with Marsh, and a just perceptible colouration with the Gutzeit.

That the presence of iron in the zinc used had a very material influence in the delicacy of either test, it was found repeatedly that where ·004 mg. of As. could be detected, using the Gutzeit test with iron-free zinc, as much as ·012 mg. was needed to produce a similar colouration when zinc containing iron was used. It would appear, therefore, that, using iron-free reagents, we may reckon upon detecting ·004 mg. of As. By the Gutzeit test this is equivalent, when 4 grammes of the drug are used, to one part of arsenic per million, and by increasing the quantity of material operated upon we may, within limits, still further reduce the proportion of arsenic detectable. It seems probable that greater refinement than this is not needed in pharmaceutical work, and, starting out with this assumption, the greater number of the substances mentioned in the "Recommendations" were submitted to the test to see how ordinary commercial B.P. qualities compared with the prescribed standards. Among the results obtained were the following :—

Samples found to give no perceptible stain :—

Acid. phosphoric., hydrochlor., nitric. (1·5), citric., boric., and tartaric, liq. ammon. fort., potass. acet., potass. tart. acid, potass. carb., potass. bicarb., potass. iodid., potass. sulphas, potass. chloras, potass. metabisulph., soda tartarata, sodii bromid., sodii phosphas, sodii carb., sodii bicarb., ammon. carb., zinci chlorid., zinci acet., zinci sulphocarb., calcii phosphas, calcii hydras, lithii carb., mag. carb. pond., mag. carb. levis, mag. calc. pond., mag. calc. levis, iodine, glycerine, syrup. glucosi, ferri sulphas, potassa caustica.

Samples found to give a stain less than that of one part per million of arsenium :—

Acid. citric., acid. tartaric., borax, calcii carb. præcip., acid. sulphuric., acid. nitric.

Samples found to give stains equivalent to between one and three per million :—

Borax, cerii oxalas, acid. acetic., acid. hydrobrom. dil., acid. lactic., alumen (potash and ammonia), ammon. brom., ammon. chlorid., ammon. phosph., potass. brom., potass. cit., calcii chlorid., lithii cit., magnes. sulph., phenazonum, sulphur sublim., sodii sulphas, zinci sulphas, potass. tart., sodii iodid.

Samples found to give stains exceeding three parts per million :—

Ferrum redactum, ferrum, sulphur præcip.

A few notes concerning this last group may be of interest :—

The sample of precipitated sulphur gave a very intense stain, and evidently contained arsenic in some quantity, in fact the amount was such that the present B.P. test of extracting with ammonia was sufficient to condemn the sample.

A single sample of pharmaceutical iron-wire gave about 100 parts per million. Eight samples of ferrum redactum gave the following somewhat remarkable results. Parts of arsenium per million :—

30 60 60 90 90 120 120 1,000

The standard suggested for the greater part of the B.P. chemicals is one of three per million, and a consideration of the lists given will show that, as far as this enquiry goes, the condition is one that is commercially obtainable. There are a few instances where the proposed standard is more rigid.

These are citric and tartaric acids to contain less than one per million. Acids sulphuric, nitric and hydrochloric to contain less than three-tenths per million. Liq. ammon. fortis., to contain less than one-tenth per million.

In the case of the three mineral acids alone do these requirements seem too stringent. It is a difficult matter to obtain acids of such purity, and we think any reasonable need would be met by the practicable standard of one per million. Much adverse criticism has been passed upon the question of ferrum redactum. The standard proposed was admittedly one which a large proportion of the ferrum redact. on the market at the time of publication failed to attain.

A reduced iron containing less than 100 parts per million is, however, now easily obtainable, and we think pure enough for all practicable purposes.

In conclusion, although more experience and a consideration of results obtained by other workers is necessary before coming to any final decision, it appears to us from the results of our work that the test embodied in Messrs. Dunstan and Robinson's recommendation is well adapted for pharmaceutical use, and while its delicacy will suffer by comparison with the Marsh method, it is sufficient for the use in question, and it has decided advantages in point of simplicity and ease of application. The standards fixed do not appear except in the few instances mentioned to be too onerous, and their inclusion in the monographs of a future edition of the Pharmacopœia would, we think, tend to render more definite and more satisfactory a subject which is capable of causing much trouble and anxiety to all the branches of our calling.

FURTHER CONTRIBUTIONS TO THE ASH QUESTION WITH REGARD TO DRUGS.

THERE has been little fresh matter contributed on this subject during the past year. We have, however, continued to make determinations of ash, both in entire and powdered drugs whenever occasion offers. We think that should it be the intention of the compilers of a new Pharmacopœia to include additional standards for ash-yield in drugs, these figures will be of value, and the number cannot well be too great. It should be clearly understood, as we have pointed out before, that these figures all refer to commercial specimens of drugs, authenticated, but not in any way differentiated by special preparation from drugs offered for sale.

TABLE showing ash-yield per cent. yielded by various drugs of good quality, and by powders ground in our own mills, such powders being in most instances ground from other parcels of drugs than those represented by the entire drug.

(The figures in italics are new figures added to the table as the result of this year's work.)

	Whole drug.	Powder from own mills.
Acaciæ gummi ..	.. 2·74	2·99
	2·80	3·18
	2·73	
Aconiti radix (Anglic)	.. 1·96	
(Exotic)	.. 4·51	7·65
	3·16	
	2·63	
	3·91	
Aloe Barbadensis	.. 1·73	1·51
	1·17	2·58
Aloe Capensis ..	..	*6·59*
Aloe Socotrina ..	.. 2·08	2·09
	0·77	*2·80*
Aloe Uganda ..	.. 0·59	
Aloinum	.. 1·04	
Althææ radix ..	.. *5·13*	*5·93*
Ammoniacum ..	.. 1·99	
	8·43	
	2·69	
Anethi fructus ..	.. 7·73	
	7·82	
	11·48	
Anisi fructus ..	.. 7·70	8.30
		10·78
		8.89
		9·55
	10·31	*7·54*
(Spanish)	.. 6·04	
(Russian)	..14·82	
	11·28	
Anthemidis flores	.. 5·72	6·28
	5·78	

	Whole drug.	Powder from own mills.
Anthemidis flores ..	5·54	
	5·54	
	5·51	
	3·95	
	4·40	*5·87*
	4·45	
Araroba	.. 2·53	
	1·62	
Arnicæ flores ..	.. *8·19*	
Arnicæ rhizoma ..	.. 7·08	
	5·08	
Aurantii cortex ..	.. 5·17	
	4·54	
	6·06	
	3·46	
	4·18	
Belladonnæ folia ..	..12·82	10·85
	8·46	8·63
Belladonnæ radix	.. 9·26	5·29
	5·08	
	5·73	
	10·22	
	4·13	
	5·56	
	4·47	
Benzoinum ..	.. 0·92	
	0·55	
Balsamum Tolutanum ..	0·40	
	0·36	
	0·34	
	0·39	
Buchu folia ..	.. 4·71	4·04
	8·36	4·18
	4·17	*4·49*
	3·52	
Calendulæ flores ..	.. *7·29*	
Calumbæ radix ..	.. 4·72	6.97
	4·53	6·44
	4·79	*6·61*
	7·67	
	3·79	
	5·18	
Cambogia	.. 0·38	1·81
Cannabis Indica ..	..15·56	14·92
	13·12	
	14·72	
Cantharis	.. 5·08	7·63
	5·25	5·31
	4·61	
(Chinese)	.. 4·01	
	4·54	
Capsici fructus ..	.. 5·37	6·06
	3·65	4·68
	3·88	
Cardamomi fructus	.. 4·50	
	5·12	

	Whole drug.	Powder from own mills.
Cardamomi semina	.. 7·53	
	3·49	
	3·70	7·01
	11·06	
Carui fructus ..	.. 6·20	6·74
	5·76	6·20
	4·49	
	5·98	*6 44*
Caryophyllum ..	.. 4·62	4·66
	5·37	
	6·01	
	3·67	
	4·72	
Cascara Sagrada ..	.. 5·51	
	6·09	
	4·16	
Cascarilla	.. 8·27	
	6·95	
	5·47	
Cassiæ pulpa ..	.. 2·57	
Catechu	.. 3·38	5·34
	3·04	*3·36*
Chirata	.. 4·01	3·09
Chrysarobinum ..	.. 0·11	
	0·16	
Cimicifugæ rhizoma	.. 6·21	
	5·14	
Cinchonæ rubræ cortex	.. 1·36	5·20
		2·83
	6·26	*5·98*
Cinchonæ cortex (flav.)	.. *0·91*	*1·07*
Cinnamomi cortex	.. 4·94	4·75
	4·17	4·47
	4·10	*4·49*
Cocæ folia (Bolivian)	.. 4.02	
(Peruvian)	.. 8·08	6·54
Coccus	.. 3·41	9·49
	5·36	8·91
	2·54	
	3·06	
	3·90	
Colchici cormus ..	.. 1·85	2·91
		1·98
	2 09	*2·04*
Colchici semina ..	.. 4·02	5·25
		6·92
Colocynthidis pulpa	..12·00	
	10·10	
	12·40	
	11·40	
	11·20	
	11·70	
	11·20	
	11·70	
Conii folia ..	..15·14	
	5·36	11·89
Conii fructus ..	.. 5·53	
	6·27	

	Whole drug.	Powder from own mills.
Coriandri fructus ..	4·06	
	4·93	
	4·05	5·17
	3·60	
	4·10	
	4·79	
Cubebæ fructus	6·42	7·32
	5·07	*5·88*
Curcumæ rhizoma ..		*5·71*
		7·76
Cuspariæ cortex	8·02	
	7·29	
Cusso	9·40	
	9·84	
Cymini fructus	*7·17*	*12·10*
		10·14
Damianæ folia	*6·74*	
Digitalis folia	11·21	9·39
	9·80	6·35
	10·90	
Elaterium	4 20	
Ergota	3·19	3·25
	2·82	4·10
	2·92	2·69
	3·07	4·31
	3·70	3·14
Eucalypti gummi ..	0·17	
Euonymi cortex	8·96	
	8·56	
Filix mas	3·27	
	2·85	
Fœniculi fructus ..	8·46	10·79
	7·22	
Fœnigraeci semina ..		*5·88*
		4·20
Galbanum	4·45	
	4·38	
Galla	1·76	1·75
		1·67
Gelsemii radix	1.57	
	1·79	
	1·48	2·08
	1·32	*2·07*
Gentianæ radix	2·43	4·53
	3·54	
	2·67	4·16
	3·50	*3·14*
	5·34	*3·27*
Glycyrrhizæ radix ..	4·47‡	3·30
	4·85	
	2·04	
	3·66	
	3·17	*5·59*
Granati fructus cortex ..	2·23	

	Whole drug.	Powder from own mills.
Granati cortex	5·99	
	6·08	
Guaiaci lignum	1·05	
	1·29	
Guaiaci resina	0·60	2·50
Guaiaci rasuræ	*0·76*	
Hæmatoxyli lignum ..	1·58	
	1·29	1·81
Hamamelidis cortex ..	3·42	
	2·94	4·06
Hamamelidis folia ..	5·54	
	4·32	
	4·51	
Hemidesmi radix ..	3·76	
	3·59	
Hydrastis rhizoma ..	4·35	9·23
	5·28	*6·96*
Hyoscyami folia (Exotic)	21·91	
(Anglic)	14·02	
	8·72	12·83
Inulæ radix		*7·21*
Ipecacuanhæ radix ..	2·38	2·23
	2·12	2·65
	2·45	2·03
	2·69	2·19
	2·38	3·38
		2·72
		2·59
		3·29
		2·55
		2·88
		2·49
	2·73	*3·30*
Ipecacuanhæ radix (spurious—Asclepias curassavica)	*3·35*	
Iridis rhizoma	*1·18*	
Jaborandi folia	4·54	
	4·63	
	4·16	
	4·01	
Jalapa	4·31	3·78
	3·33	
	3·46	
	3·61	
	3·62	3·49
	2·39	*3·72*
Jalapæ resina	0·22	
Juniperi baccæ	*2·87*	
Kino	0·80	
Krameriæ radix	2·51	4·37
	2·68	3·71
	4·78	

‡ Not decorticated.

	Whole drug.	Powder from own mills.
Laurocerasi folia	6·21†	
	4·96†	
Limonis cortex	3·66	
	3·50	
Lini semina	*3·46*	*4·65*
	5·12	
Lobelia	3·37	9·48
	4·68	
	3·84	
	3·33	6·94
	6·13	
Lupulin	13·42	
Lupulus	6·90	
	7·46	
	8·69	
	11·26	
Maticæ folia	*9·82*	
Mezerei cortex	3·09	
	2·70	
Myristica	1·91	2·46
	1·68	
	1·52	2·19
Myrrha	2·58	5·82
	6·69	10·72
Nux Vomica	1·13	2·45
	1·11	1·73
Opium	3·77	7·18
	6·34	4·52
	3·61	
	2·77	
Papaveris capsulæ	11·28	
	8·63	
	7·56	
Pareiræ radix	2·49	
	3·13	
	2·69	
	3·20	
Physostigmatis semina	3·11	
	2·97	
Pimenta	2·82	3·55
	3·61	3·79
	3·18	*3·60*
Piper album	*0·83*	
Piper nigrum	3·26	6·32
	3·41	5·01
	3·04	
	3·66	
Podophylli rhizoma	3·16	
	2·41	
Pruni Virginianæ cortex	2·96	
	2·53	
Pterocarpi lignum	1·52	
	1·40	

	Whole drug.	Powder from own mills.
Pyrethri radix	3·89	
	5·01	
	4·96	
Quassiæ lignum	2·51	
	2·31	
	2·88	
Quillaiæ cortex	7·99	8·19
	6·38	8·44
	7·07	
Rhei radix	4·93	8·80
	7·27	10·01
		10·69
Rhei radix (Anglic)	7·19	7·85
	6·92	
	5·84	
Rosæ Gallicæ petala	1·84	
	3·11	
	2·40	
	3·34	
Sambuci flores	10·20	
	9·10	
	9·70	
Sarsæ radix	6·02	
	8·02	
	5·82	
	9·69	
(Mexican)	10·46	
(Honduras)	5·75	
(Lima)	5·12	
	5·78	
Sassafras radix	0·77	
	2·29	1·32
Scammoniæ radix	9·12	
	12·65	7·13
	6·50	
Scammonium	3·42	
Scilla	2·08	2·51
	2·15	2·38
	2·11	
	1·80	
	1·70	
Scoparii cacumina	2·26	
	2·39	
Senegæ radix	4·26	4·24
	2·94	4·12
	2·59	*4·20*
Senna Alexandrina	7·88	8·61
	8·55	
	8·15	*8·51*
Senna Indica	8·35	9·45
	7·33	
	8·67	
	6·82	
	7·71	
	6·82	*8·78*

† Dried.

	Whole drug.	Powder from own mills.
Serpentariæ rhizoma	.. 5·76	10·13
	9·10	
Sinapis albæ semina	.. 4·05	
Sinapis nigrae semina	.. 4·31	
	4·18	
Sinapis		4·22
		3·57
		4·15
		4·32
		4·32
Staphisagriæ semina	..13·26	11·69
	12·35	15·13
Stramonii folia ..	..20·18	22·02
	19.31	
	13·97	
	16·45	24·81
	16·55	*18·12*
	12·94	
	17·91	
Stramonii semina	.. 2·44	
	2·04	
Strophanthi semina	.. 3·78	
	3·51	
Sumbul radix ..	.. 6·09	
	4·19	
	7·22	
Tamarindus ..	.. 2·42	
Taraxaci radix ..	.. 3·20	
	4·23	
	3·42	
Tragacantha ..	.. 1·98	2·07
	1·73	2·21
	3·24	
Ulmi cortex		*7·72*

	Whole drug.	Powder from own mills.
Ulmi fulvæ cortex	.. *9·55*	
Uvæ Ursi folia ..	.. 2·45	
	2·54	
	2·27	
Valerianæ rhizoma	..11·61	17·44
	11·02	
	7·67	
	13·23	
	12·16	
Zingiber	.. 4·11	3·02
	2·43	3·78
	2·37	5·23
	2·57	6·27
	2·50	4·03
	4·89*	5·91
	5·29*	
	4·11*	
	4·35*	
	3·51	
	4·38	
	5·43	
	4·58*	
	4·13	
	7·37*	
	4·24	
	3·67	*5·00*
	3·30	*5·90*
	4·09	
	6·01	
	6·14	
	4·59	
	4·08	
	3·56	
	5·40	

* Bleached.

ESSENTIAL OILS.

Aniseed.—Two samples were examined having specific gravities of 0·981 and 0·983 at 20°C., and rotations of −1·5° and −0·57° respectively.

Bergamot.—Two samples examined possessed the following characters:—

Specific gravity	0·8825,	0·8835
Linalyl acetate	40·10,	37·88 per cent.
Non-volatile matter	4·35,	7·66 ,,

Solubility in 2 vols. of 80 per cent. alcohol in both cases satisfactory.

Cajuput.—The specific gravities of fourteen samples of this oil lay between 0·917 and 0·924.

A further sample with specific gravity 0·916 was soluble in an equal volume of 80 per cent. alcohol, and contained 51·2 per cent. of Cineol, determined by the phosphoric acid process.

Caraway.—A sample of English oil gave:—

Specific gravity	0·915
Optical rotation	+75·0°

Distillate above 200°, 57 per cent.

A sample of foreign oil proved to be practically decarvolized, and gave:—

Specific gravity	0·845
Rotation	+103·35°

Distillate above 200°, 2 per cent.

Carvol.—A single sample gave satisfactory readings:—

Specific gravity	0·963
Rotation	+58·36°

Distillate above 220°, 99 per cent.

Cinnamon Oil.—Two samples of this oil examined were evidently mixtures of the true oil and the leaf oil. The results obtained were:—

Specific gravity	1·046,	1·047
Cinnamic aldehyde	29·0,	24·0 per cent.

Clove Oil.—The analyses of eight samples gave the following results:—

Specific gravity	1·049 to 1·054
Eugenol	80 to 90 per cent.

(Determined by Caustic Potash method).

Coriander Oil.—Two specimens tested gave:—

Rotation	+10·48°,	−1·29°
Behaviour with 3 vols. of 70 per cent. alcohol	Soluble.	Insoluble.

The characters of the second of these oils were evidently highly abnormal and suspicious.

Cubebs.—A single batch of our own distillation gave:—

Specific gravity	0·920
Rotation	−28·53°

Distillate 250° to 280°C., 94 per cent.

Cumin.—One sample of this oil gave:—

Specific gravity	0·911
Rotation	+3·96°

Soluble 1 in 5 of 80 per cent. alcohol.

Dill.—Two samples possessed very similar properties:—

Specific gravity	0·904,	0·904
Rotation	76·72°,	76·43°
Distillate above 220°C.	32·0,	28·0 per cent.

Eucalyptus.—The characters of eleven samples examined all corresponded with those required by the Pharmacopœia:—

Specific gravity	0·913 to 0·927
Rotation	−6·54° to +2·32°

Phellandrene absent in all cases.

Fennel.—A single sample of "Bitter" Fennel Oil had specific gravity 0·913. Two samples of "Sweet" Oil gave:—

Specific gravity	0·970,	0·9755
Rotation	+14·51°,	+8·31°
Solidifying point	+5°,	+10°

The properties of the latter oil appear to point to its derivation from Sweet or Roman Fennel (Fœniculum dulce).

Geranium.—A sample of East Indian Geranium Oil gave the following extraordinary figures:—

Specific gravity	0·9545
Geraniol	55·6 per cent.

Insoluble in 3 vols. of 70 per cent. alcohol.

Lavender.—A single sample of English oil gave:—

Specific gravity	0·882
Linalyl acetate	11·06 per cent.

Five samples of good quality foreign oils gave:—

Specific gravity	0·887 to 0·889
Linalyl acetate	26·77 to 30·33

Orange Oil.—	SWEET.	BITTER.
Specific gravity	0·849 ...	0·856
Rotation	−89·13° ...	−88·28°

Peppermint.—Five samples of various sources gave the following figures:—

	ENGLISH.		AMERICAN.	JAPANESE.	
Specific gravity ...	0·9065,	0·907	0·907	0·900,	0·900
Menthyl acetate per cent.	6·05,	7·06	10·00	8·29,	7·73
Free Menthol per cent.	49·09,	54·66	58·86	49·17,	49·41

Petitgrain.—The specific gravity of the single sample examined was 0·889, and saponification showed 39·53 per cent. of Linalyl acetate.

Pine.—A sample of the official oil gave:—

Specific gravity	0·8745
Rotation	−10·49°
Bornyl acetate	6·98 per cent.

Distillate below 165°C., 2 per cent.

Pennyroyal.—The single sample tested proved to be genuine. Its characters were:—

Specific gravity	0·938
Rotation	+20·18°

Soluble 1 in 2 of 70 per cent. alcohol.

Rosemary.—Two parcels of English oil gave rather widely differing figures :—

Specific gravity	0·930, 0·905
Rotation	−1·10, +0·55°

Both soluble in 2 vols. of 90 per cent. alcohol.

Five samples of foreign oil proved to be of very unequal quality :—

Specific gravity	0·878 to 0·914
Rotation	−2·73° to +7·66°

Rue.—A single sample tested again serves to show the amount of adulteration that this article is liable to :—

Specific gravity	0·860
Rotation	−15·54°
Solidifying point	below −7°C.

Insoluble in 3 vols. of 70 per cent. alcohol.

Savin.—A sample of foreign oil examined possessed characters very different to that to which objection was taken last year :—

Specific gravity	0·917
Rotation	+41·95°

Sandal Wood.—A large number of samples of this oil have been examined with somewhat varying results; the greater part of them fell within the accepted limits, the actual figures being :—

Specific gravity	0·972 to 0·980
Rotation	−16·24° to −18·68°
Santalol	90·30 to 98·14 per cent.

Three other samples gave the following curious results :—

Specific gravity... ...	0·972	0·975	0·978
Rotation...	−16·55°	−16·05°	−17·28°
Santalol	87·22	81·55	98·39 per cent.
Behaviour with 6 vols. of 70 per cent. alcohol	Soluble	Insoluble	Insoluble

GALENICAL PREPARATIONS, etc.

A CONSIDERATION of this subject naturally leads to the question of standardization, a development of scientific pharmacy to which we have for many years devoted very considerable attention, and the application of which to the whole of the official galenicals has been our aim. We again include our table of such standards, with but slight alteration from last year, and hope in the future to continue our work by devising fresh processes and standards and in adopting new methods of assay to Galenical Preparations. The method of Garsed for the separation of the alkaloids of Cocaine has been investigated with a view to the adoption of a standard for Cocaine in the liquid extract, and although not yet complete the results given may be of interest.

The question of the liability of Camphorated Oil to loss of camphor by volatilization has been fully dealt with in view of the diametrically varying statements that have been made.

In addition to these points the following notes include matters of interest that have arisen in the course of a year's work.

Aconite, Alcoholic Extract.—A sample drawn from a large batch of extract gave 3·93 per cent. of total Ether soluble alkaloids.

Belladonna, Green Extract.—We had occasion last year to comment upon the very low alkaloidal figures yielded by this extract, and which seemed to us to indicate such extreme variation in a potent preparation as to render its standardization or entire deletion from the official pages a matter of necessity.

This year we find the extract more satisfactory, the product from several tons of the green herb when bulked and assayed yielded 1·08 per cent. of total alkaloids by titration. Presumably the difference is to be accounted for by the fact that the summer of 1904 was much drier than that of 1903.

Belladonna, Green Alcoholic Extract.—A batch prepared from the dried leaves contained 2·82 per cent. of total alkaloids by titration.

Blaud's Pills.—Less activity has been shown with regard to this preparation by the Food and Drugs Acts inspectors. Presumably, the effect of last year's prosecutions has been to remove the inferior makes from the market. We continue to assay every batch of pills prepared, and guarantee them to contain the official quantity of Ferrous Carbonate and to keep this strength undiminished for any reasonable length of time.

In order to satisfy ourselves that our Blaud's Pills would keep under any ordinary conditions for a reasonable time, we, in June, 1903, divided a batch of pearl-coated and a batch of plain Blaud's Pills into two parts; one half of each was kept in bottles, the other in shallow slide boxes. These pills were all assayed weekly from that date to September, 1904, and during that time not the slightest diminution in strength took place, the percentage of Ferrous Carbonate present being identical whether the pills were plain or coated, bottled or simply exposed to the air in card boxes.

It should be clearly understood that these results were obtained with Blaud's Pills of our own manufacture, prepared according to the B.P. formula, with slight modification.

The result of this experiment, we think, fairly proves that a Blaud's Pill may be obtained which can be kept in stock under ordinary conditions without fear of liability to oxidation.

Camphor, Liniment.—Camphorated Oil has long been a favourite article for the attention of the public analyst, and when a deficiency of camphor has been alleged, the defence has

either been that the British Pharmacopœia contains no standard for the oil, or that loss had taken place by volatilization.

The former point has been quite recently dealt with by a London Stipendiary Magistrate, who gave as his decision in the case in dispute, that although the British Pharmacopœia does not give any direct standard for the preparation when finished, yet, in the absence of evidence of decomposition, the quantities ordered by the Pharmacopœia are, by implication, considered to be a standard for the finished article.

The question regarding possible loss of camphor by volatilization is a disputed one, R. A. Cripps, on the one hand (*The Pharmaceutical Journal*, Sept. 10, 1904, p. 418), stating that even at summer temperatures little loss of camphor was to be observed from an open bottle, while on the other hand, W. Johnson (*The Chemist and Druggist*, Nov. 26, 1904, p. 868) states that the oil may become far below standard even when kept in a stoppered bottle.

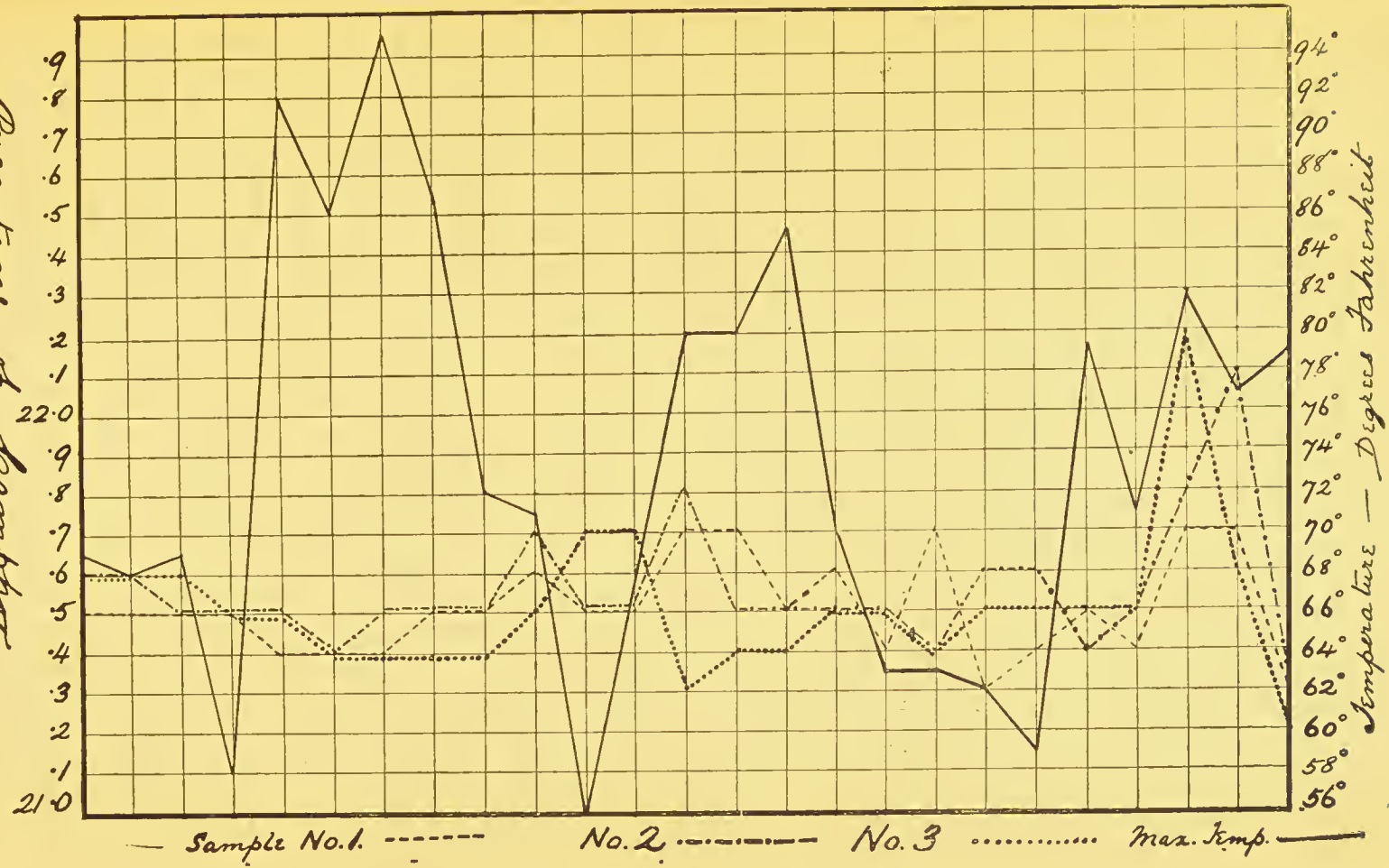
With a view to gain some information on this point, we put in hand in September of this year a series of experiments, starting out with a liniment containing 21·59 per cent. of camphor. Three pint bottles were filled with the liniment. No. 1, an ordinary glass-capped oil round; No. 2, a corked narrow-mouth bottle; No. 3, a narrow-mouth bottle perfectly open.

These three bottles were kept for alternate fortnights first in the Laboratory, where the temperature varied between 56° and 72°F., then in an artificially-warmed room, ranging from 71° to 95°F. Maximum temperatures were read daily.

From each bottle a small quantity of the camphorated oil was poured out each day, the intention being to make the experiment under the most trying conditions the preparation is ever likely to be subjected to.

Camphor was determined by the method of Leonard and Smith (*The Analyst*, 1898, p. 28) twice weekly for three months, at the end of which time the bottles were empty.

Maximum temperatures and the percentages of camphor observed are shown as curves in the diagram herewith.


Percentages of Camphor
.9
.8
.7
.6
.5
.4
.3
.2
.1
22·0
.9
.8
.7
.6
.5
.4
.3
.2
.1
21·0
94°
92°
90°
88°
86°
84°
82°
80°
78°
76°
74°
72°
70°
68°
66°
64°
62°
60°
58°
56°
Temperature — Degrees Fahrenheit
Sample No. 1.
No. 2.
No. 3
Max. Temp.

It will be seen that even under the conditions shown, camphor liniment may be kept for three months in an open bottle without any appreciable loss of camphor.

In all cases certain slight but distinct variations in strength are noticeable from the table, particularly towards the end of the experiments, when the amount of camphor present at times apparently exceeds that originally present. The reason of this peculiar behaviour was found in the fact that when the contents of the bottles were getting low, a slight sublimate of camphor was observed on the sides immediately above the oil, so that when the quantity for analysis was poured out a portion of this sublimate was dissolved therein, giving a slightly high value. However, the residual oil, even when the last drachm was tested, never contained less than 21·2 per cent. of camphor.

In connection with these experiments, we have made some notes upon the question of the liability of camphorated oil to become rancid, and we find that when the oil is kept under the conditions of the previous experiments, there is a small but definite increase in the amount of free oleic acid present, the amount of the increase not differing in the three cases.

The actual increase observed was from 2·39 to 2·82 per cent.

The conclusions to be drawn from these experiments seem to be that a pharmacist may keep Lin. Camph. P.B. under ordinary shop conditions for three months at least, without any appreciable loss of camphor, and that it is advisable to shake the bottle occasionally, especially when the contents are getting low.

Cocæ Ext. Liq.—It will possibly be remembered that last year we adopted a temporary standard for this preparation of 0·5 per cent. of total alkaloids. We have recently made some experiments with the method published by Garsed (*Pharmaceutical Journal*, 1903, 2, p. 784), in the hope of being able to substitute this standard by one for pure Cocaine.

The process was first tried upon crude Cocaine, the sample operated upon yielding 77·65 per cent. total alkaloid. Results were as follows :—

	Process 1.		Process 2. (In duplicate.)	
Cinnamyl-Cocaine ...	34·80	...	30·92	31·38
Truxilline	1·93	...	2·64	3·37
Cocaine	50·35	...	44·09	42·90
	87·08	...	77·65	77·65

(In process No. 2, Cocaine is determined by difference).

Operating upon two samples of Ext. Cocæ Liq., the following figures were obtained by process 2. (No. 2 sample was not B.P.) :—

	Sample 1.		Sample 2. (In duplicate.)	
Alkaloids from 100 cc.				
Total ...	0·51	...	0·13	0·13
Cinnamyl-Cocaine ...	0·28	...	0·053	0·059
Truxilline	0·04	...	0·010	0·016
Cocaine (by difference)	0·20	...	0·063	0·054

Although process 2 has the disadvantage that Cocaine is determined by difference, in our hands it proved to give rather better results than process 1. In both cases the determination of Truxilline seemed to be the weakest point in the method, the quantity present was very small, and very slight errors in titration had a considerable effect upon the result.

On the whole, it is apparent that Cocaine may be determined with a fair amount of accuracy by one of these processes, and with further experiences a standard may be fixed for the official fluid extract.

Colchicum Ext.—A sample of a large batch gave 1·32 per cent. total alkaloid, a figure which is about a mean of the two observed last year.

Henbane, Extract of.—We find the alkaloidal content of this extract to vary considerably less than that of Belladonna, this year's figure for our bulked extract being 0·10 per cent. total alkaloids by titration.

Hyoscyamus Muticus, Tincture of.—A further batch of this tincture prepared according to the B.P. process for Tr. Hyoscy. gave exactly the result of last year, viz., 0·05 per cent. alkaloids by titration.

Iron Scale Preparations.

Iron and Ammonium Citrate.—Ferric Oxide, determined in several batches, prepared by ourselves to B.P. directions, varied from 33·1 to 33·3 per cent.

Iron and Quinine Citrate.—Quinine similarly ranged from 15·4 to 15·8 per cent.

Jalap, Extract of.—A sample of a quantity prepared during the year gave—Total resin, 25·60 per cent.

Resin insoluble in Ether, 23·25 per cent.

Mercury Ointment.—We continue to assay every batch manufactured. Metallic Mercury present ranged from 47·6 to 49·9 per cent.

Scammony Resin.—The ash of two samples prepared was 1·07 to 1·37 per cent. respectively.

TABLE

SHOWING SUGGESTED STANDARDS, RANGES

OF SPECIFIC GRAVITY, ETC.,

FOR

GALENICAL PREPARATIONS.

Name of Preparation.	Range of Specific Gravity.	STANDARD. (Where there is no active principle mentioned the figure given represents total extractive.) Grammes per 100 c.c.	Range of per-centage (by vol me) of Alcohol.	Remarks
Acetum Cantharidis	1·066 to 1·072			
,, Ipecacuanhæ	0·991 to 0·993	3·62 HA. 0·1 total alkaloid	11 to 12·5	
,, Scillæ	1·035 to 1·040	8·0 4·0 acetic acid		
Collodium	0·775 to 0·782	2·0		
,, Flexile	0·790 to 0·797	6·5		
Decoctum Aloes Compositum	1·001 to 1·004	5·6	16 to 17	
,, Granati Corticis Conc.		30·0		
,, Hæmatoxyli Conc.		3·0		
Extractum Belladonnæ Liquidum	0·896 to 0·912	*0·75 total alkaloid	72·0 to 75·0	
,, ,, Viride		1·0 total alkaloid		
,, Cascaræ Sagradæ Liquidum ..	1·070 to 1·080	26·0	17·0 to 18·0	
,, Cimicifugæ Liquidum	0·890 to 0·900	12·5	74 to 78	
,, Cinchonæ Liquidum	1·115 to 1·150	*5·0 total alkaloid	10·5 to 12·0	
,, Cocæ Liquidum	1·004 to 1·014	0·5 total alkaloid 20 ether soluble	45·5 to 49·5	
,, Colocynthidis Compositum† ..				
,, Ergotæ Liquidum	1·020 to 1·027	15·0	31·5 to 32·5	
,, Filicis Liquidum	1·000 to 1·019			
,, Glycyrrhizæ Liquidum	1·140 to 1·150	42·0	16·0 to 18·0	
,, Hamamelids Liquidum	1·025 to 1·050	21·0	33 to 34	
,, Hydrastis Liquidum	1·025 to 1·040	20·0	37·5 to 38·5	
,, Hyoscyami Viridi		0·1 total alkaloid minm.		
,, Ipecacuanhæ Liquidum	0·885 to 0·910	*2·00 to 2·25 total alkaloid	75·0 to 79	
,, Jaborandi Liquidum	1·020 to 1·040	20·0	33 to 34	
,, Jalapæ		20 resin insoluble in ether		
,, Nucis Vomicæ Liquidum ..	0·950 to 0·970	*1·5 strychnine	57·5 to 61·5	
,, Opii Liquidum	0·985 to 0·990	*0·75 morphine	17·5 to 18·5	

Extractum Pareiræ Liquidum	1·050 to 1·065	22·5	20 to 22
,, Sarsæ Liquidum	1·080 to 1·090	20·0 (without Glycerine)	15 to 17
,, Strophanthi ‡		4·0 strophanthin	
,, Taraxaci Liquidum	1·070 to 1·090	25·0	16 to 20
Glycerinum Acidi Borici	1·345		
,, ,, Carbolici	1·230		
,, ,, Tannici	1·288 to 1·292		
,, Aluminis	1·288 to 1·292		
,, Boracis	1·280 to 1·295		
,, Pepsini	1·190 to 1·200	1 fluid dr. should dissolve 12,000 grains hard boiled white of egg.	
Infusum Aurantii Conc.		10·2	
,, ,, Compositum Conc. ..		7·2	
,, Buchu Conc...		6·0	
,, Calumbæ Conc.		3·5	
,, Caryopylli Conc.		5·0	
,, Cascarillæ Conc.		2·0	
,, Chiratæ Con.		4·5	
,, Cinchonæ Acidum Conc.		total alkaloid?	
,, Cuspariæ Conc.		8·0	
,, Digitalis Conc.		1·6	
,, Gentianæ Compositum Conc. ..		6·0	
,, Krameriæ Conc.		8·0	
,, Lupuli Conc.		7·0	
,, Quassiæ Conc.		0·25	
,, Rhei Conc.		10·0	
,, Scoparii Conc.		15·0	
,, Senegæ Conc.		10·0	
,, Sennæ Conc...		14·0	
,, Serpentariæ Conc.		4·5	
,, Uvæ Ursi Conc.		10·0	
Linimentum Aconiti	0·865 to 0·875	0·25 total ether soluble alkaloid	78·0 to 80·0
,, Belladonnæ	0·880 to 0·900	*0·375 total alkaloid	69·0 to 72·0

* Officially Standardized. † Scammony resin ‡ *P.J.*, 1898 (2), p. 665.

Name or Preparation.	Range of Specific Gravity.	STANDARD. (Where there is no active principle mentioned the figure given represents total extractive.) Grammes per 100 c.c.	Range of percentage (by volume) of Alcohol.	Remarks.
Linimentum Camphoræ	0·924 to 0·927	21·5 camphor		
,, ,, Ammoniatum ..	0·866 to 0·872		57·0 to 58	
,, Saponis	0·895 to 0·900		62 to 64·0	
Liquor Calumbæ Conc.	0·990 to 0·996	4·25	19·0 to 21·0	
,, Chiratæ Conc.	1·000 to 1·010	5·5	18·0 to 19·0	
,, Cusparæ Conc.	1·005 to 1·015	10·0	18·0 to 19·0	
,, Hamamelidis	0·980 to 0 985		16·0 to 18·0	
,, Iodi Fortis	1·010 to 1·025	11·5 iodine	76·0 to 77·0	
,, Krameriæ Conc.	1·015 to 1·025	10·0	18·0 to 19·0	
,, Picis Carbonis	0·855 to 0·865	2·5		
,, Quassiæ Conc.	0·975 to 0·980	0·30	18·0 to 19·0	
,, Rhei Conc.	1·020 to 1·030	12·5	18·0 to 19 0	
,, Sarsæ Compositus Conc	1·030 to 1·040	15·0	18·0 to 20·0	
,, Senegæ Conc...	1·015 to 1·025	12·5	18·5 to 22·0	
,, Sennæ Conc.	1·040 to 1·060	17·5	18·0 to 19·0	
,, Serpentariæ Conc.	0·990 to 1·000	5·0	18·0 to 19·0	
Mistura Sennæ Co.	1·110 to 1·118	16·5	14·4 to 16·6	
Oxymel	1·320*	4·4 acetic acid		
,, Scillæ	1·320*	2·0 acetic acid		
Pulv. Glycyrrhizæ Comp.		9·0 sulphur		
,, Rhei Comp.		68 to 70 ash		
Succus Belladonnæ	0·980 to 0·990		18·0 to 22·0	
,, Conii	0·980 to 0·990		18·0 to 22·0	
,, Hyoscyami	0·980 to 0·990		18·0 to 22·0	
,, Scoparii	0·980 to 0·990		18·0 to 22·0	
,, Taraxaci	0·995 to 1·000			
Syrupus Aromaticus	1·148 to 1·156			
,, Aurantii	1·270 to 1·280			
,, Calcii Lactophosphatis	1·310 to 1·320			
,, Cascaræ Aromaticus	1·110 to 1·125			

Syrupus Chloral	1·315 to 1·320		
,, Codeinæ	1·320 to 1·328		
,, Ferri Phosphatis	1·270	*$Fe_3(PO_4)_2$—1 gr. in [each fluid dr.	
,, ,, Phos. c. Quin. et Strych. ..	1·275 to 1·285		
,, Glucosi	1·363 to 1·370		
,, Hemidesmi	1·325 to 1·330		
,, Limonis	1·290 to 1·300		
,, Pruni Virginianæ	1·300 to 1·320		
,, Rhei	1·310 to 1·320		
,, Rosæ	1·325 to 1·330		
,, Scillæ	1·330 to 1·335		
,, Sennæ..	1·280 to 1·290		
,, Tolutanus	1·330 to 1·335		
,, Zingiberis	1·300 to 1·310		
Tinct. Aconiti	0.890 to 0.897	0·02 total ether soluble alkaloid	68·0 to 70·0
,, Aloes	0·970 to 0·985	8·5	38·0 to 41·0
,, Arnicæ	0·890 to 0·894	0·6	68·8 to 69·8
,, Asafetidæ	0·914 to 0·920	10·0	56·0 to 62·0
,, Aurantii	0·880 to 0·890	2·0	72·5 to 76·0
,, Belladonnæ	0·912 to 0·920	*0·05 total alkaloid	60·0 to 61·0
,, Benzoini Comp.	0·900 to 0·905	About 5·0 total balsamic acids, of which about 2·0 are free and 3·0 combined.	68·5 to 72·5
,, Buchu	0·930 to 0·935	4·0	56·0 to 57·0
,, Calumbæ	0·920 to 0·925	1·0	56·0 to 58·0
,, Camphoræ Comp.	0·915 to 0·920	*0·05 morphine	56·0 to 59·0
,, Cannabis Indicæ	0·844 to 0·850	4·0	83·0 to 86·0
,, Cantharidis	0·835 to 0·838	0·25	87·0 to 89·0
,, Capsici	0·890 to 0·897	1·50	67·5 to 69·5
,, Cardamomi Comp.	0·945 to 0·950	6·50	54·0 to 56·0
,, Cascarillæ	0·900 to 0·905	1·6 resin	62·5 to 67·5
,, Catechu	0·972 to 0·978	14·5	51·0 to 53·0
,, Chiratæ	0·920 to 0·924	0·8	56·0 to 58·0
,, Chloroformi et Morph. Comp. ..	1·010 to 1·020		52·0 to 54·0

* Officially Standardized,

Name of Preparation.	Range of Specific Gravity.	STANDARD. (Where there is no active principle mentioned the figure given represents total extractive.) Grammes per 100 c.c.	Range of percentage (by volume) of Alcohol).	Remarks.
Tinct. Cimicifugæ	0·922 to 0·928	2·0	57·0 to 59·0	
,, Cinchonæ	0·915 to 0·925	*1·0 total alkaloid	63·0 to 64·5	
,, Cinchonæ Comp.	0·915 to 0·921	5·00 *0·5 total alkaloid	62·0 to 68·0	
,, Cinnamomi	0·900 to 0·904	2·4	66·0 to 68·0	
,, Cocci	0·950 to 0·955	2·5	42·0 to 44·0	
,, Colchici Seminum	0·945 to 0·955	0·075 total alkaloid	42·0 to 44·0	
,, Conii	0·895 to 0·900	0·09 total alkaloid	66·0 to 68·5	
,, Croci	0·924 to 0·928	3·00	56·0 to 58·0	
,, Cubebæ	0·840 to 0·845	2·0 oleo-resin	83·0 to 85·0	
,, Digitalis	0·928 to 0·934	3·6	53·0 to 57·5	
,, Ergotæ Ammon.	0·932 to 0·939	4·0	48·0 to 52·0	
,, Ferri Perchlor	1·085 to 1·088		18·0 to 21·0	
,, Gelsemii	0·917 to 0·925	0·025 total alkaloid	57·0 to 59·0	
,, Gent. Comp.	0·964 to 0·968	5·0	42·5 to 43·5	
,, Guaiaci Ammon.	0·894 to 0·900	15·0	69·0 to 71·0	
,, Hamamelidis	0·950 to 0·954	2·0	42·0 to 44·0	
,, Hydrastis	0·920 to 0·926	2·5	56·0 to 58·0	
,, Hyoscyami	0·950 to 0·965	0·008 total alkaloid	40·5 to 42·5	
,, Iodi	0·878 to 0·882	*2·5 iodine	84·0 to 86·0	
,, Jaborandi	0·950 to 0·960	0·048 total alkaloid	42·0 to 44·0	
,, Jalapæ	0·905 to 0·910	*1·5 resin	65·0 to 67·0	
,, Kino	0·992 to 0·996	5·0 kino-tannic acid	43·0 to 44·5	
,, Krameriæ	0·934 to 0·938	5·0	56·0 to 58·0	
,, Lavand Comp.	0·836 to 0·840	0·6	86·5 to 88·5	
,, Limonis	0·880 to 0·888	2·0	67·5 to 71·5	
,, Lobeliæ Æther	0·810 to 0·816	0·07 lobeline	58·0 to 60·0	
,, Lupuli	0·930 to 0·940	4·0	54·0 to 57·0	
,, Myrrhæ	0·850 to 0·855	5·6	84·0 to 86·0	
,, Nucis Vomicæ	0·910 to 0·914	*0·25 strychnine	58·0 to 64·0	

Tinct. Opii	0·955 to 0·960	*0·75 morphine	40·0 to 44·0
,, Opii Ammon.	0·895 to 0·900	*0·113 morphine	60·0 to 63·0
,, Podophylli	0·850 to 0·855	3·65 resin	84·5 to 89·0
,, Prunі Virg.	0·930 to 0·938	3·0	52·0 to 57·0
,, Pyrethri	0·895 to 0·900	2·25 (0·22—0·36)	66·0 to 69·0
,, Quassiæ	0·944 to 0·948	0·05 quassin	42·0 to 44·0
,, Quillaiæ	0·918 to 0.924	1·25	56·0 to 58·0
,, Quininæ	0·885 to 0·895		72·5 to 76·0
,, ,, Ammon.	0·925 to 0·928		53·0 to 54·0
,, Rhei Comp.	0·970 to 0·975	4·50 (Exclusive of Glycerine	51·0 to 53·0
,, Scillæ	0·955 to 0·962	10·0	52·0 to 54·0
,, Senegæ	0·935 to 0·938	6·5	55·0 to 57·0
,, Sennæ Comp.	0·985 to 0·994	10·00	38·5 to 40·5
,, Serpentariæ	0·896 to 0·900	2·00	66·0 to 68·0
,. Stramonii	0·950 to 0·964	0·04 total alkaloid	42·0 to 44·0
,, Strophanthi	0·892 to 0·895	0·2 strophanthin	67·0 to 69·0
,, Sumbul	0·895 to 0·900	2·5	66·0 to 69·0
,, Tolutana..	0·860 to 0·865	about 3 balsamic acids $\frac{1}{3}$ of which are free	80·0 to 82·0
,, Valerianæ Ammon.	0·935 to 0·942	3·0	50·0 to 54·0
,, Zingiberis	0·835 to 0·840	0·4	88·5 to 89·5
Vin. Colchici	1·010 to 1·015	7.0	
,, Ferri		0.40 total Fe.	

* Officially Standardized

"LOFOTOL."

IN the Twelfth Report we gave some particulars of this new invention, which is intended to supersede Emulsions of Cod Liver Oil. These preparations consist largely of mucilage, sugar, etc., whilst "Lofotol" is simply the finest Cod Liver Oil impregnated with Carbonic Acid Gas.

On account of its scientific nature and therapeutic value, we make no apology for quoting the following opinions of the Medical and Pharmaceutical Press:—

The British Medical Journal says—

> "We have opened a bottle three times a day for a week, and abstracted a teaspoonful on each occasion, and the oil is still abundantly charged with gas. It must not be assumed that the carbon dioxide has entered into chemical combination. In this preparation the taste of the oil is certainly covered to a marked extent, the sensation produced in the mouth being similar to that experienced on the introduction of an effervescing lozenge."

The Lancet says—

> "Many steps have been taken to make cod liver oil palatable, but none could be simpler than that adopted with the preparation known as 'Lofotol.' The method has the advantage that the oil is in no way diluted, while probably its digestibility is increased rather than impaired."

The Hospital says—

> "'Lofotol' is a sparkling oil, prepared from a pure cod liver oil charged with carbonic acid gas. The advantages of this novelty in pharmaceutical art are:—1. Palatability, owing to the sharp sparkling taste. 2. Rapidity of digestion, owing to the stimnlating influence of the gas. 3. Freedom from a tendency to turn rancid."

The Pharmaceutical Journal says—

> "One of the most ingenious devices adopted for overcoming the unpleasant characteristics of cod liver oil is that utilised in the production of 'Lofotol.' The oil is supersaturated with the gas, and, owing to its viscosity, this unstable physical condition can be maintained for longer periods than is possible with freshly-opened bottles of recently-prepared aerated water."

The Chemist and Druggist says—

> "The effect of the addition of the gas is to give an oil of greater palatability, easier digestion, and with less tendency to oxidation and and rancidity."

The British and Colonial Druggist says—

> "An emulsion of cod liver oil, containing practically 100 per cent. of oil, sounds almost fictional, and yet that is what 'Lofotol' really is. Unlike the ordinary emulsions, it contains neither gum nor sugar, but is simply prepared by supersaturating pure Norwegian cod liver oil with carbonic acid gas."

GUARANTEE OF QUALITY.

ALL Tinctures, Infusions, Liquid Extracts, and in fact most of the Galenicals we supply are Standardized by our special methods, full particulars of percentage contents being in most instances given on the label.

When we label a drug or preparation P.B. we take full responsibility for its quality, and are prepared to stand by the fact that it is as labelled when it leaves our warehouse, and similarly we guarantee all unofficial preparations to be in accordance with the description on the labels.

THE QUALIFIED RETAIL CHEMIST AS AN ANALYST.

WE again wish to draw the special attention of our customers and others to the arrangements we have made whereby they may undertake analytical work required by the public. We are fully convinced that a lucrative business might be done in this class of work if proper facilities for obtaining analyses on reasonable terms were placed within reach of the public. The daily increasing demand for assurance as to the purity of foods and drinks should, in our opinion, be put to profitable use by qualified chemists, and where, as is often the case, it is impossible for them to undertake work of this class themselves, it is obvious to us that the opportunity of having it done speedily, and of at the same time sharing in the proceeds, will be generally acceptable.

Detailed circulars will be sent free on application.

SURGICAL DRESSINGS DEPARTMENT.

THE analytical work in connection with this department consists in the supervision of the chemical processes used in the bleach works, and in the preparation of antiseptics, as well as in the testing of the latter after manufacture, in order to ascertain whether they contain the stated proportions of antiseptic agent. Being, as we believe, the only Manufacturing Chemists in the world who weave, bleach, and manufacture Surgical Dressings plain and antiseptic from the raw materials, we are particularly well placed for turning out these goods in a satisfactory manner, and the supervision which our Analytical Department is able to use in these works is of considerable value. In addition to the routine work alluded to above, researches are constantly being made with a view of improving and developing the processes used, and for further information we refer our customers to the separate price list which we publish of Surgical Dressings and similar goods.